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Antibiotic sensitivity of *Escherichia Coli* isolated from apparently healthy chicken of selected areas of Bangladesh

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ABSTRACT

Escherichia Coli isolated from broiler, layer, sonali and indigenous breeds of chicken from Bogra, Gazipur and Joypurhat districts of Bangladesh were used for in-vitro drug sensitivity test in the Department of Microbiology and Hygiene, Bangladesh Agricultural University. Eight commonly used antibiotic discs of different groups were used for antibiotic sensitivity tests of the isolated *E. coli*. Among the antibiotics Amoxicillin and Tetracycline were 100% resistant and 0% sensitive and intermediate sensitive. Ciprofloxacin was 4.48% sensitive, 20.90% intermediate and 74% resistant. Cephradin was 0% sensitive, 20.90% intermediate and 79.10% resistant. Cephalexin was 20.90% sensitive, 55.22% intermediate and 23.88% resistant. Gentamycin was 89.55%, 4.48% intermediate to 7.46% resistant. Kanamycin was 86.57% sensitive, 5.97% intermediate and 7.46 % resistant. Streptomycin was 1.49% sensitive, 0% intermediate and 80.60% resistant. Considering all the matters multidrug resistant *E. coli* is prevailing in apparently healthy chicken, which may become a big threat for poultry industry and as well as for human health.

Introduction

Poultry rearing is a common practice in Bangladeshi people since prehistoric period. Now a day, development of poultry rearing has been established as an industry. The poultry industry plays a crucial role in economic growth and simultaneously, creates numerous employment opportunities (Shamsuddoha and Sohel, 2003). Layer and broiler birds are being reared in modern farming system. Beside the hybrid, indigenous breeds are also being reared as back yard poultry in villager's house. Recently *Sonali* (Rhode Island Red × Fayomi) breed becoming popular due to their adaptability and acceptability under the climatic conditions of Bangladesh (Anisuzzaman and Wahid, 1988).

The treatment of *E. coli* infection in poultry is mediated by different kinds of antimicrobial agents, such as Ciprofloxacin, Erythromycin or Kanamycin etc. These antimicrobial agents are being used as an important therapeutic tool in poultry production. However, isolates of *E. coli* from poultry are possessing resistance frequently to one or more of these antimicrobial agents (Jakaria, 2011). This resistance possesses two fold problem. Firstly the poultry industry has few antimicrobial agents to which *E. coli* has not already resistant. Secondly, the public health community is concerned that humans eating poultry meat from flocks treated with antimicrobial agents may lead to acquire poultry bacteria resistant against their normal flora (Charles et al., 2001).

Antibiotics are extensively used as growth promoters in poultry production or to control infectious disease. Anti-microbial exercise and/ or especially abuse is considered to be the most vital selecting force to antimicrobial resistance of bacteria (Moreno et al. 2000; Okeke et al. 1999). Moreover, antibiotic treatment is considered the most important issue that promotes the emergence, selection and spreading of antibioticresistant microorganisms in both veterinary and human medicine (Witte 1998). It was stated by well established evidence that antibiotics can lead to the emergence and dissemination of resistant E. coli which can then be passed into people via food or direct contact with infected animals. These resistant microbes may function as a potential source in the transportation of antimicrobial resistance to human pathogens (Van de Bogaard et al. 2001; Schroeder et al. 2002). At butchery/slaughter, resistant strains from the gut readily contaminate poultry carcasses which often cause contamination of poultry meats and eggs during lay with multi resistant E. coli (Botham 1983; Lakhotia and Stephens 1973; Turtura et al. 1990). Therefore, the present study was designed to determine antibiogram profile of *E. coli* isolates of chicken for assessing their susceptibility and resistance patterns to some selected antimicrobials.

MATERIALS AND METHODS

Antibiotic sensitivity test

In vitro antibiotic sensitivity test was done according to the guidelines of Clinical and Laboratory Standard Institute (CLSI), 2007, formerly it was known as NCCLS using disc diffusion test. Briefly

the bacerial isolates were inoculated into Nutrient Agar and Selection of 3 to 5 well isolated colonies from the agar plate were selected. The top of the colony was touched with a loop and the growth was transferred into a tube containing 4 to 5 ml of saline solution. The turbidity with 0.5 McFarland Standard was adjusted and inoculated into Mueller Hinton Agar. The antibiotic disc into Mueller Hinton Agar was placed and the zone of diameter was measured according to the CLSI (2007) standard.

Inoculum preparation

To standardize the inoculums density for a susceptibility test, a $BaSO_4$ turbidity standard, equivalent to a 0.5 McFarland standard or its optical equivalent was used. At least 3-5 well isolated colonies of the same morphological type were selected from an agar plate culture. The top of the colony was touched with a loop and the growth was transferred into a tube containing 4-5 ml of a suitable broth medium such as tryptic soy broth. The broth culture was incubated at 35^oC until it achieves or exceeds the turbidity of the 0.5 McFarland standards. The turbidity of the actively growing broth culture is adjusted with sterile saline or broth to obtain turbidity optically comparable to that of the 0.5 McFarland standards. This results in a suspension containing approximately 1-2 $x10^8$ CFU/ ml.

Inoculation of test plates

Optimally, within 15 minutes after adjusting the turbidity of the inoculums suspension, a sterile cotton swab is dipped into the adjusted suspension. The swab was rotated several times and pressed firmly on the inside wall of the tube above the fluid level. The dried surface of a Mueller- Hinton agar plate is inoculated by streaking the swab over the entire sterile agar surface. The lid was ajarred for 3 to 5 minutes, but no more than 15 minutes, to allow for any excess surface moisture to be absorbed before applying the drug impregnated disks.

Application of discs to inoculated agar plates

The predetermined battery of antimicrobial discs was dispensed onto the surface of the inoculated agar plate. Each disc was pressed down to ensure complete contact with the agar surface. Whether the discs were placed down individually or with a dispensing apparatus, they were distributed evenly so that they are no closer than 24 mm from centre to centre. The plates were inverted and placed in an incubator set to 35^oC within 15 minutes after the disc was applied. After 16 to18 hours of incubation each plate was examined. If the plate was satisfactorily streaked, and the inoculum was correct, the resulting zones of inhibition were uniformly circular and there were a confluent lawn of growth. The diameters of the inhibition zones were measured to the nearest whole millimeter, using sliding calipers or a ruler, which was held on the back of the inverted petri plate. The results were recorded at 16-18 hours post incubation. Transmitted light was used to examine the zone of inhibition.

Table 1. Antimicrobial agents, their disc concentrations and interpretation standard (Clinical and Laboratory Standard Institute (CLSI), 2007)

Antimicrobial Agents	Disc concentration (µg/disc)	Interpretation of results (Zone diameter in mm)		
		S	I	R
Amoxicillin	30 µg	≥ 18	14-17	≤14
Cephradin	25 µg	≥16	13-15	≤12
Cephalexin	30 µg	≥17	12-15	≤11
Ciprofloxacin	5 µg	≥21	16-20	≤15
Gentamycin	10 µg	≥15	13-14	≤12
Kanamycin	30 µg	≥18	14-17	≤13
Streptomycin	10 µg	≥15	12-14	≤11
Tetracycline	30 µg	≥15	12-14	≤11

µg= Microgram; mm= Millimeter; S=Sensitive; I= Intermediately sensitive; R=Resistant.

Results and Discussion

Antibiotic sensitivity tests

Table 2. Antibiotic sensitivity and resistance pattern of *E. coli* isolates from broiler chicken

Sampling Area	Isolates	Sensitive	Intermediate	Resistant
Bogra	B-1	GEN, K, CN		Cip, S, CH, TE,AMX
	B-2	GEN ,K	CH, CN	Cip, S, TE,AMX
	B-3	GEN, K	S, CN	Cip CH, TE,AMX
	B-4	GEN, K, CN		Cip, S, CH, TE.AMX
	B-8	GEN, K	S,CN	Cip, CH, TE,AMX
	B-9	K, GEN	CN	Cip, S, CH, TE,AMX
	B-10	K, GEN,CN		Cip, S, CH, TE,AMX
Gazipur	B-1	K, GEN	CN	Cip, S, CH, TE,AMX
	B-2	GEN	K, CN	Cip, S, CH, TE,AMX
	B-5	K GEN	Cip,S	CH,CN, TE,AMX
	B-7	K ,GEN	CN	Cip, S, CH,TE,AMX
	B-9	GEN, K,S	Cip, CN	CH, TE,AMX
	B-12	K, GEN	Cip, CN	S,CH, TE,AMX
	B-15		GEN, CN	Cip, S, K, CH, TE,AMX

AMX=Amoxicillin, CH= Cephradin,CN = Cephalexin, Cip = Ciprofloxacin, GEN= Gentamycin, K = Kanamycin, S = Streptomycin, TE = Tetracycline.

Table 3. Antibiotic sensitivity and resistance pattern of *E. coli* isolates from layer chicken

Sample Area	Isolates	Sensitive	Intermediate	Resistant
Bogra	L-1	GEN, K	CN	AMX, Cip, CH, S, TE
	L-2	GEN, K	CN	AMX, Cip, CH, S, TE
	L-3	GEN, K	CN	AMX, Cip, CH, S, TE
	L-5	GEN	K	AMX, Cip, CH, CN, S,TE
	L-6	GEN		AMX, Cip, CH, CN,K,S,TE
	L-8	GEN,K		AMX, Cip, CH, CN, S,TE
	L-9	GEN,K		AMX, Cip, CH, CN, S, TE
	L-12	GEN, K	CN	AMX, Cip, CH, S,TE
	L-14	GEN,K	CN	AMX, Cip, CH, S, TE
	L-15	GEN, K	CH, CN	AMX, Cip, S, TE
Gazipur	L-1	GEN,K		AMX, Cip, CH, CN, S,TE
	L-2	GEN, K		AMX, Cip, CH, CN, S,TE
	L-3	GEN, K	CN	AMX, Cip, CH, S,TE
	L-4	GEN,K	CH,	AMX, Cip, CN, S, TE
	L-5	GEN,K		AMX, Cip, CH,CN, S,TE
	L-6	GEN	K	AMX, Cip, CH,CN,S,TE
	L-7	GEN, K		AMX, Cip, CH,CN,S,TE
	L-8	GEN, K	CN	AMX, Cip, CH, S,TE
	L-9	GEN,K	CH, CN	AMX, Cip, S,TE
	L-10	GEN, K	CH,	AMX, Cip, CN, S, TE

Overall sensitivity pattern of *E. coli*

Among the antibiotics Amoxicillin and Tetracycline were 100% resistant and 0% sensitive and intermediate sensitive. Ciprofloxacin was 4.48% sensitive, 20.90% intermediate and 74% resistant. Cephradin was 0% sensitive, 20.90% intermediate and 79.10% resistant. Cephalexin was 20.90% sensitive, 55.22% intermediate and 23.88% resistant. Gentamycin was 89.55%, 4.48% intermediate to 7.46% resistant. Kanamycin was 86.57% sensitive, 5.97% intermediate and 7.46 % resistant. Streptomycin was 1.49% sensitive, 0% intermediate and 80.60% resistant. (Table 6)

Antibiotic sensitivity and resistance pattern of *E. coli* isolates based on the breeds of chicken

All the isolates from layer and indigenous chicken were sensitive to Gentamycin. On the other hand 100% indigenous were sensitive to Kanamycin. 92.86% broiler and 64.70% sonali were sensitive to Gentamycin. 85.72% broiler, 80% layer and 82.35% indigenous were sensitive to Kanamycin. 21.43% broiler, 29.42% and 37.5% indigenous were sensitive to Cephalexin. 12.5% indigenous and 5.88% sonali were sensitive to Ciprofloxacin and Streptomycin. No isolates of broiler, layer, sonali and indigenous were sensitive to Amoxicillin, Cephradin and Tetracycline. No isolates of layer were sensitive to Ciprofloxacin, Cephalexin and streptomycin. No isolates were of sonali and indigenous were sensitive to streptomycin. No isolates of broiler were sensitive to Ciprofloxacin (Table 7).

Table 4. Antibiotic sensitivity and resistance pattern of *E. coli* isolates of Sonali chicken

Sampling Area	*E. coli* Isolates	Sensitive	Intermediate	Resistant
Bogra	S-1	GEN,K	CN,	AMX, Cip, CH, S, TE
	S-3	Cip, GEN, K,CN	Cip, CH	AMX, S, TE
	S-4	GEN, K, CN	Cip, CH	AMX, Cip, S, TE
	S-5	GEN, K	CN, CH	AMX, Cip,S, TE
	S-7	GEN,Cip, K	CN	AMX, CH, S, TE
	S-8	CN, GEN, K	CH	AMX, Cip,S, TE
	S-11	GEN, K	Cip, CH, CN	AMX, S, TE
	S-13	GEN, K	CN	AMX, Cip, CH, S, TE
	S-14	Gen, K, CN		AMX, Cip, CH, S, TE
Joypurhat	S-2	K	CH, CN	AMX, Cip, GEN,S, , TE
	S-4	K	GEN, CN	AMX, Cip, CH, S, TE
	S-5	CN, GEN, K	CH,	AMX, Cip, S, TE
	S-6		CN,	AMX, Cip, CH, GEN, K, S, TE
	S-7	K	CN	AMX, Cip, CH, GEN, K, S, TE
	S-8			AMX, Cip, CH, CN, GEN, S, TE
	S-9			AMX, Cip, CH, CN, GEN,K,S,TE
	S-10	K	CH, GEN, CN	AMX, Cip, S, TE

Table 5. Antibiotic sensitivity and resistance pattern of *E. coli* isolates of Indigenous chicken

Sample Area	Isolates	Sensitive	Intermediate	Resistant
Joypurhat	I-1	GEN, K	Cip,	CH, CN, S, AMX, TE
	I-2	GEN, K	Cip, CN	CH, S, AMX, TE
	I-4	Cip, GEN, K		CH, CN, S, AMX, TE
	I-7	CN,GEN, K	Cip,	CH,S, AMX, TE
	I-9	Cip, GEN, K	CN	CH,S, AMX, TE
	I-11	CN,GEN, K	Cip,	CH,S, AMX, TE
	I-13	GEN, K	Cip, CN	CH,S, AMX, TE
	I-15	GEN, K	CN	Cip, CH, S, AMX, TE
Gazipur	I-2	CN, GEN, K	Cip,	CH,S, AMX, TE
	I-3	GEN, K	Cip, CN,	CH,S, AMX, TE
	I-4	GEN, K	S, CN	CH,Cip, AMX, TE
	I-5	GEN, K	CN	CH, Cip, S, AMX, TE
	I-6	CN,GEN, K	S,	CH, Cip, AMX, TE
	I-7	GEN, K	Cip, S, CN	CH, AMX, TE
	I-8	CN,GEN, K	Cip, S,	CH,AMX, TE
	I-9	CN,GEN, K		CH, Cip, AMX, TE

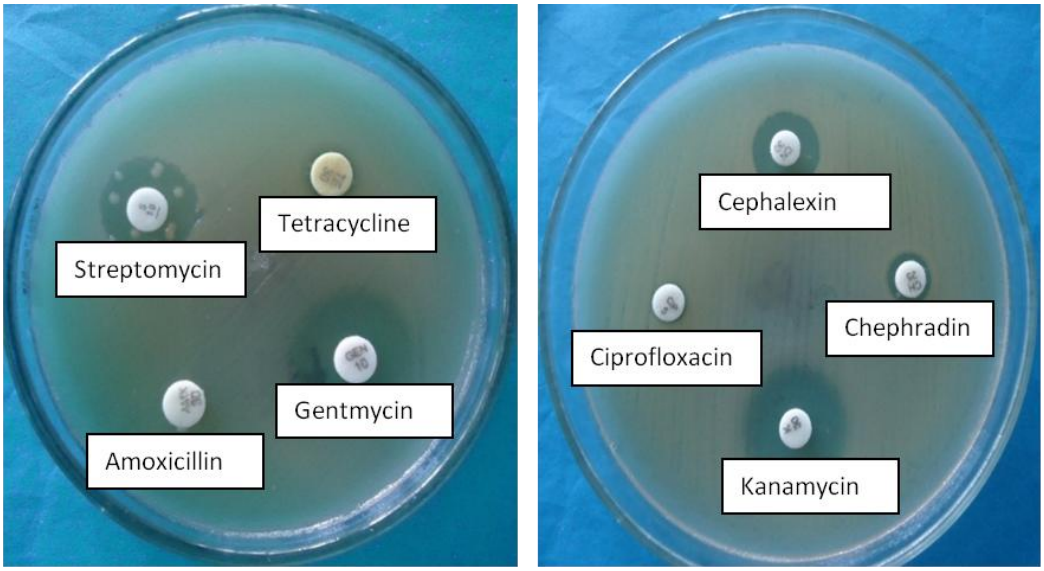

Figure1. Diameter of zone of inhibition around antibiotic discs

It was observed that 71.43% *E. coli* isolates from broiler, 45% from layer, 55.82% from sonali and 50% from indigenous chicken were intermediate sensitive to Cephalexin. 28.57% broiler and 50% indigenous were intermediate to streptomycin. 7.14% broiler, 20% layer, 47.06% sonali and 6.25% indigenous were intermediate to Cephradin. 21.43% broiler, 11.77% sonali and 56.25% indigenous were intermediate to Ciprofloxacin. 7.14% broiler and 5.88% sonali were intermediate to Gentamycin. 7.14% broiler and 15% layer were intermediate to streptomycin. No isolates of broiler, layer, sonali and indigenous were intermediate to Amoxicillin and tetracycline. No isolates of layer were intermediate to Ciprofloxacin, Gentamycin and Streptomycin. No isolates of sonali were intermediate to Kanamycin and Streptomycin. No isolates of indigenous were intermediate to Gentamycin and Kanamycin (Table 7).

Table 6. Overall sensitivity and resistance pattern of *E. coli*

Name of Antibiotic	Sensitive %	Intermediate %	Resistance %
Amoxicillin	0.00	0.00	100
Ciprofloxacin	4.48	20.90	74
Cephradin	0.00	20.90	79.10
Cephalexin	20.90	55.22	23.88
Gentamycin	89.55	4.48	7.46
Kanamycin	86.57	5.97	7.46
Streptomycin	1.49	0.00	80.60
Tetracycline	0.00	0.00	100.00

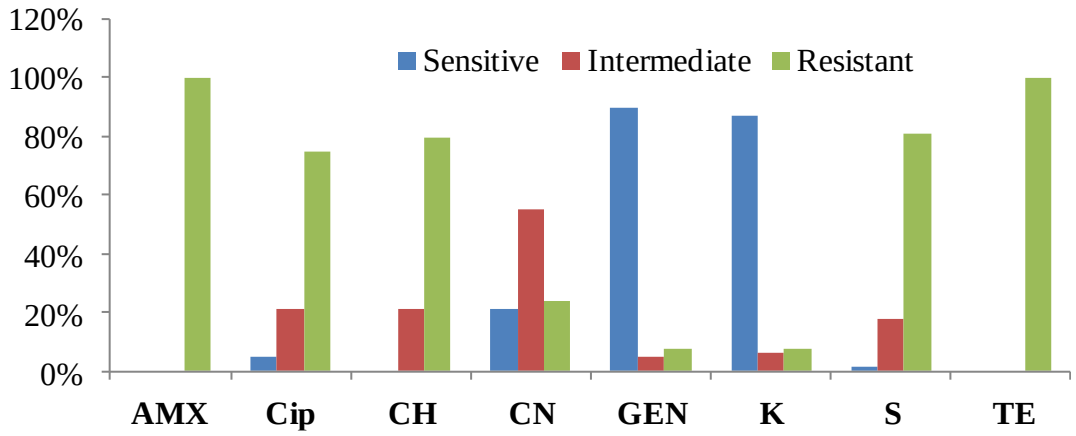

Figure 2. Over all sensitivity and resistance pattern of *E. coli* to different antibiotics

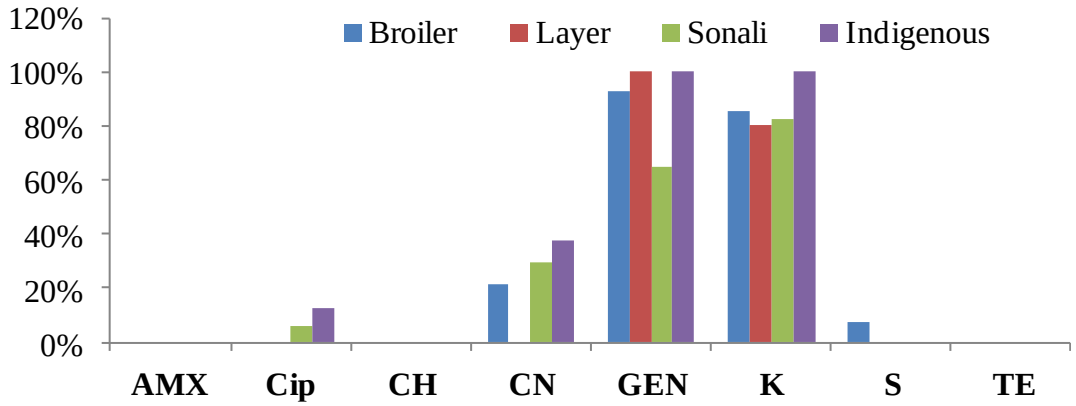

Figure 3. Sensitivity pattern of *E. coli* isolates from broiler, layer, sonali and indigenos breeds of chicken

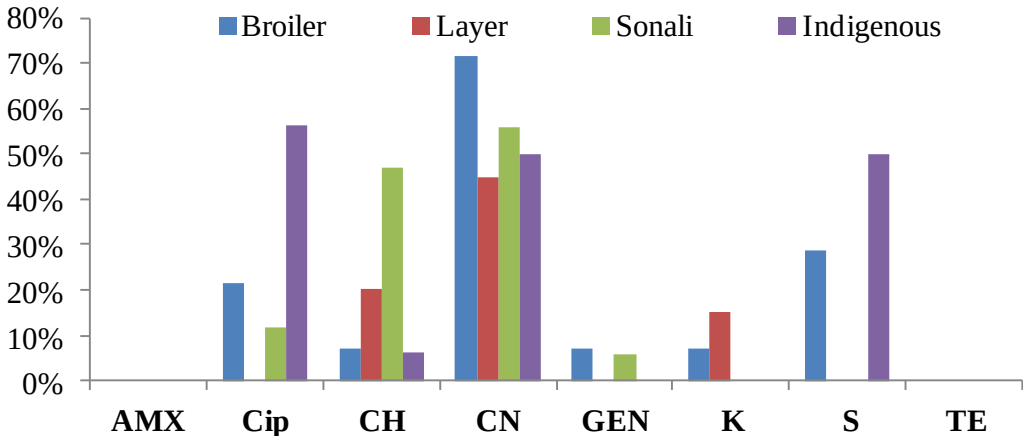

Figure 4.Intermediate sensitivity pattern of *E. coli* isolates from broiler, layer, sonali and indigenous breeds of chicken

All the isolates were resistant to Amoxicillin and Streptomycin. All the isolates from layer and sonali were resistant to Streptomycin. All the isolates from layer were resistant to Ciprofloxacin. Most of the broiler, layer and indigenous isolates (92.86%, 80% and 93.75% respectively) were resistant to Cephradin. In case of Ciprofloxacin 78.57% broiler, 82.35% sonali and isolates were resistant. 50% of indigenous isolates and 64.29% broiler isolates to streptomycin, 52.94% sonali isolates to cephradin, 55% layer isolates to Cephalexin were resistant. 31.25% indigenous to Ciprofloxacin and 29.42% sonali to Gentamycin were resistant .17.65% sonali to Kanamycin, 12.50% indigenous and 11.76% sonali to Cephalexin were resistant. 7.14% broiler isolates were resistant to Cephalexin and

Kanamycin. 5% layers were resistant to Kanamycin. 0% broiler, layer and indigenous isolates were resistant to Gentamycin. Whereas 0% indigenous isolates were resistant to Kanamycin (Table 7).

Table 7. Antibiotic sensitivity and resistance pattern of *E. coli* from broiler, layer, sonali and chicken

Source of *E. coli*	Antibiotic	Sensitive %	Intermediate %	Resistant %
Broiler	AMX	0.00	0.00	100.00
	Cip	0.00	21.43	78.57
	CH	0.00	7.14	92.86
	CN	7.14	21.43	71.43
	GEN	92.86	7.14	0.00
	K	85.72	7.14	7.14
	S	7.14	28.57	64.29
	TE	0.00	0.00	100.00
Layer	AMX	0.00	0.00	100.00
	Cip	0.00	0.00	100.00
	CH	0.00	20.00	80.00
	CN	0.00	45.00	55.00
	GEN	100.00	0.00	0.00
	K	80.00	15.00	5.00
	S	0.00	0.00	100.00
	TE	0.00	0.00	100.00
Sonali	AMX	0.00	0.00	100.00
	Cip	5.88	11.77	82.35
	CH	0.00	47.06	52.94
	CN	29.42	58.82	11.76
	GEN	64.70	5.88	29.42
	K	82.35	0.00	17.65
	S	0.00	0.00	100.00
	TE	0.00	0.00	100.00
Indigenous	AMX	0.00	0.00	100.00
	Cip	12.5	56.25	31.25
	CH	0.00	6.25	93.75
	CN	37.5	50.00	12.5
	GEN	100.00	0.00	0.00
	K	100.00	0.00	0.00
	S	0.00	50.00	50.00
	TE	0.00	0.00	100.00

Region basis antibiotic sensitivity and resistance pattern

E. coli isolates of Bogra were sensitive 100% to Gentamycin, 88.46%to Kanamycin, 26.92%, to Cephalexin , 3.85% to Ciprofloxacin . In case of Gazipur, 96% to Gentamycin, 88% to Kanamycin and 4% to Cephalexin streptomycin. In case of Joypurhat, 62.5% to Gentamycin, 75% to Kanamycin, 18% to Cephalexin and 12.5% to Ciprofloxacin. (Table 8)

E. coli isolates of Bogra were intermediate sensitive, 57.70 to Cephalexin, 30.77% to Cephradin and 7.70% to Ciprofloxacin, Streptomycin and Kanamycin. In case of Gazipur, 52% to Cephalexin, 36% to Streptomycin, 28% to Ciprofloxacin, 16% to Cephradin, 8% Kanmycin and 4% Gentamycin. In case of Joypurhat, 56.25% to Cephalexin, 31.25% to Ciprofloxacin, 18%. 75% to Cephradin and 6.25% to Streptomycin and Gentamycin. (Table 8)

Whereas, *E. coli*isolates of Bogra were resistant 100% to Amoxicillin and Tetracycline, 92.30% to Streptomycin, 88.46% to Ciprofloxacin, 69.23% to Chephradin and 15.38% Cephalexin. In case of Gazipur 1oo% to Amoxicillin and Tetracycline, 84% to Chephradin, 72% Ciprofloxacin, 60% to Streptomycin, 32% to Cephalexin and 4% to Kanamycin. In case of Joypurhat, 100% to Amoxicillin and Tetreacycline, 93.75% to Streptomycin, 81.25% to Chephradin, 31.25% to Gentamycin, 25% to Cephalexin and 18.75% to Kanamycin (Table 8).

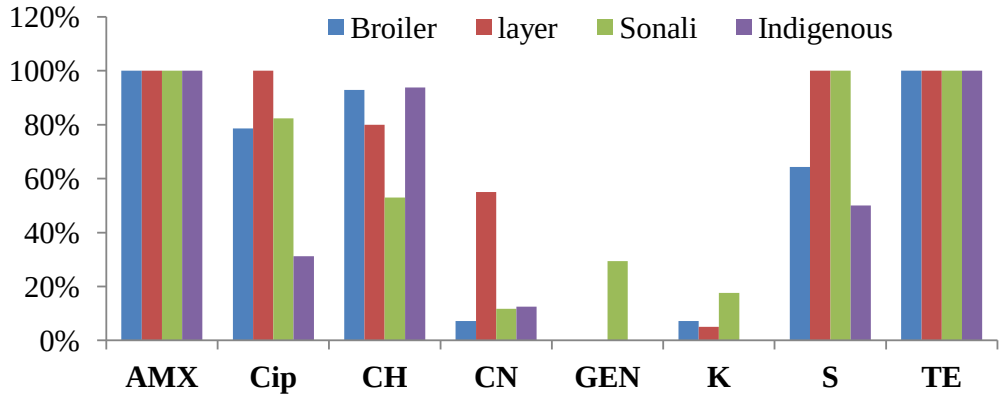

Figure 5. Resistance pattern of *E. coli* isolates from broiler, layer, sonali and indigenous breeds of chicken

Table 8. Region basis antibiotic sensitivity and resistance pattern

Antibiotic	Bogra			Gazipur			Joyprhat		
	S %	I %	R %	S %	I %	R %	S %	I %	R %
AMX	O	0	100	0	0	100	0	0	100
Cip	3.85	7.70	88.46	0	28	72	12.5	31.25	56.25
CH	0	30.77	69.23	0	16	84	0	18.75	81.25
CN	26.92	57.70	15.38	16	52	32	18.75	56.25	25
GEN	100	0	0	96	4	0	62.5	6.25	31.25
K	88.46	7.70	3.85	88	8	4	75	0	18.75
S	0	7.70	92.30	4	36	60	0	6.25	93.75
TE	0	0	0	0	0	100	0	0	100

S = Sensitive, I = Intermediate and R = Resistant.

Table 9. Region and breed basis antibiotic sensitivity and resistance pattern of *E. coli* isolates of different breeds of chicken

Type of poultry	Name of Antibiotic	Region								
		Bogra			Gazipur			Joypurhat		
		S %	I %	R %	S %	I %	R %	S %	I %	R %
Broiler	AMX	0	0	100	0	0	100			
	Cip	0	0	100	0	43	57			
	CH	0	0	100	0	0	10			
	CN	43	57	0	0	86	14			
	GEN	100	0	0	86	14	0			
	K	100	0	0	72	14	14			
	S	0	14	86	14	29	57			
	TE	0	0	100	0	0	100			
Layer	AMX	0	0	100	0	0	100			
	Cip	0	0	100	0	0	100			
	CH	0	10	90	0	30	70			
	CN	0	60	40	0	30	70			
	GEN	100	0	0	100	0	0			
	K	70	20	10	90	0	10			
	S	0	0	100	0	0	100			
	TE	0	0	100	0	0	100			
Sonali	AMX	0	0	100				0	0	100
	Cip	11	22	67				0	0	100
	CH	0	56	44				0	37	63
	CN	44	56	0				12	63	25
	GEN	100	0	0				25	12	63
	K	100	0	0				63	0	37
	S	0	0	100				0	0	100
	TE	0	0	100				0	0	100
Indigenous	AMX				0	0	100	0	0	100
	Cip				0	50	50	25	63	12
	CH				0	12	88	0	0	100
	CN				50	50	0	25	50	25
	GEN				100	0	0	100	0	0
	K				100	0	0	100	0	0
	S				0	88	12	0	12	88
	TE				0	0	100	0	0	100

S = Sensitive, I = Intermediate and R = Resistant.

Comparative study of area and breed basis antibiotic sensitivity and resistance pattern of *E. coli*

Among the *E. coli* isolates from broiler of Bogra, 100% were sensitive to Gentamycin and Kanamycin. Isolates of Gazipur 86% and 72% sensitive to Gentamycin and Kanamycin where as 0% and 14% were resistant respectively and 14% intermediate to both antibiotics. 100% isolates of both areas were resistant to Amoxicillin, Tetracycline and Cephalexin. Ciprofloxacin is 100% resistant for Bogra but in case of Gazipur 57% resistant and 43% intermediate. Streptomycin is 86% and 57% resistant, 14% and 29% intermediate, 0% and 14% sensitive for Bogra and Gazipur respectively. Cephalexin is not sensitive for Gazipur resistant for Bogra. It is 43% sensitive and 57% intermediate for Bogra where as 14% resistant and 86% intermediate for Gazipur (Table 9).

Among the layer, all isolates of Bogra and Gazipur were sensitive to Gentamycin whether resistant to Amoxicillin, Tetracycline, Ciprofloxacin and Streptomycin. Cephradin and Cephalexin are not sensitive. 90% and 70% isolates are resistant for Bogra and Gazipur respectively whether 10% and 30% are intermediate to Cephradin. 40% and 60% isolates were resistant for Bogra and Gazipur

whether 60% and 30% are intermediate to Cephalexin. In case of Kanamycin 70% and 90% are sensitive, 20% and 0% are intermediate for Bogra and Gazipur respectively and 10% are resistant for both (Table 9).

Among the sonali, all isolates of Bogra were sensitive to Gentamycin and Kanamycin whether, isolates of Joypurhat are 25% and 63% sensitive, 63% and 37% are intermediate respectively and only 12% were intermediate to gentamycin. 100% are resistant to Amoxicillin, Tetracycline and Streptomycin. All isolates of Joypurhat are resistant to Ciprofloxacin, but in caes of Bogra 11% are sensitive, 22% are intermediate and 67% are resistant. 56% and 44% isolates of Bogra were intermediate and resistant to Cephradin whether in case of Joypurhat 37% and 63%. In case of Cephalexin, isolates of Bogra are 44% are sensitive and 56% were intermediate where as isolates of Joypurhat 12% sensitive, 63% intermediate and 25% resistant (Table 9).

Among the indigenous breeds of chicken, all isolates were sensitive to Gentamycin and Kanamycin and resistant to Amoxicillin and Tetracycline. In case of Ciprofloxacin, isolates of Gazipur are 50% are intermediate and 50% are resistant whether, isolates of Joypurhat were 25% sensitive, 63% intermediate and 12% resistant. Isolates of Gazipur are 88% intermediate and 12% resistant but isolates of Joypurhat are 12% intermediate and 88% resistant to streptomycin. Cephradin is 100% resistant to the isolates of Joypurhat where as 12% intermediate and 88% resistant to the isolates of Gazipur. In case of Cephalexin, isolates of Gazipur were 50% intermediate and 50% resistant but isolates of Joypurhat are 25% sensitive, 50% intermediate and 25% sensitive (Table 9).

The antibiotic sensitivity tests of all *E. coli* isolates (67) were performed by disc diffusion method using eight different antibiotic discs. Most of the isolates were sensitive to Gentamycin (89.55%) and Kanamycin (86.55%). In case of other antibiotcs Cephalexin was 20.90% sensitive but Ciprofloxacin and Streptomycin shown very little percentage (4.48% and 1.49% respectively). On the contrary all *E. coli* isolates were resistant to Amoxicillin and Tetracycline demonstrated. Streptomycin 80.60%, Cephradin 79.10% and Ciprofloxacin 74.62 % showed the resistance percentage. Lower rates of resistance were performed by Cephalexin (23.88%), Gentamycin (7.46%), Kanamycin (7.46%). Intermediately sensitive percentages of the isolates were as, cephalexin 55.22%, Ciprofloxacin 20.90%, Cephradin 20.90%, Streptomycin 17.91%, Kanamycin 5.97% and Gentamycin 4.48%. Results of antibiotic sensitivity tests were shared with Islam (2008) and Samantha (2012) and Taslim (2006). There was little variation of antibiotic sensitivity and resistance pattern of this study with above mentioned.

In case of breed basis results of antibiotic sensitivity tests, Gentamycin was 100% sensitive to the *E. coli* isolates of layer and indigenous, but in case of broiler 92.86% and sonali 64.70%. Kanamycin was 100% sensitive to indigenous, but in case of broiler 85.72%, sonali 82.35% and layer 80%.

Amoxicillin and Tetracycline demonstrated 100% resistance to all broiler, layer, sonali and indigenous poultry. Ciprofloxacin was 100% resistant to layer, 82.35% to sonali, 78.57% to broiler and 31.25% to indigenous. Chepradin was 93.75% to indigenous, 92.86% to broiler, 80% to layer and 52.94% to sonali. Streptomycin was 100% resistant to layer and sonali, but 64.29% to broiler and 50% to indigenous. Other resistance percentage is negligible. This result might be supported by previous study of Hashem *et al.,* (2012) and Tanvir *et al.,* (2011). So from this result, it can be concluded that *E. coli* isolates of indigenous breeds of chicken were most sensitive to the antibiotics and *E. coli* isolates of sonali breeds were most resistant.

In case of area basis antibiotic sensitivity and resistance pattern of *E* coli isolates of chicken,Gentamycin was 100% sensitive to broiler, layer and sonali of Bogra and Kanamycin to Broiler and sonali. Layer of Bogra was 70% sensitive to Kanamycin. 42.86% broiler and 44.44% sonali but no layer of Bogra is sensitive to Cephalexin, where as 50% indigenous of Gazipur and 25% indigenous and 12.5% sonali are sensitive to Cephalexin.

All *E. coli* strain from layer and sonali and 85.71% broiler of Bogra; 100% layer, 57.14% broiler and 12.5% indigenous of Gazipur; 100% sonali and 87.5% indigenous of Joypurhat are resistant to Streptomycin. In case of Cephalexin, 100% broiler, 90% layer and 44.44% indigenous; 100% broiler, 70% layer and 88% indigenous of Gazipur; 100% indigenous and 63% sonali are resistant .

All *E. coli* strain from broiler and layer and 67% sonali of Bogra; 100% layer, 57.14% broiler and 50% indigenous of Gazipur; 100% sonali and 12.5% indigenous of Joypurhat are resistant to Ciprofloxacin. It can be concluded that *E. coli* isolates from layer of Gazipur and Bogra were more or less similar in sensitivity and resistance pattern. *E. coli* isolates of broiler from Gazipur were little bit less sensitive than that of Bogra. *E. coli* isolates of sonali from Joypurhat were more resistant than that of Bogra. *E* coli isolates of indigenous chicken were more resistant than that of Gazipur.

Over all observation of this study emphasizes that multiple drug resistance of *E. coli* is developing day by day. Such high incidence of multidrug resistance may presumably be due to indiscriminate use of antibiotics at the present time, which may eventually supersede the drug sensitive microorganisms from antibiotic saturated environment (Islam *et. al*., 2008). The drug resistant bacteria can spread in the environment where man and animal acquire infection with bacteria carrying drug resistant plasmids (Joseph *et al.* 1979). The resistance may either be natural such as that in *E. coli* or acquired possibly due to cross-resistance with lincosamides (Recklinghausen *et al.*, 1989). In Bangladesh there

is clear evidence of abuse of antibiotics, due to which emergence of multi-drug resistant *E. coli* are increasing continuously (Hussain *et al.,* 1982).

It may be noted that the drug sensitivity may be valuable as background information for future therapy for the effective control of the bacterial disease, otherwise indiscriminate use of the antibacterial drugs may lead to serious hazards of drug resistance. However, routine laboratory isolation and drug sensitivity test being impracticable, periodical check on the pattern of the drug sensitivity of the organisms remains all the more important.

Based on present study, it may be concluded that use of Gentamycin and Kanamycin will be of first choice of treatment against *E. coli* infection in chicken located at the study area. To a lesser extent Cephalexin may be used. It is to be noticed that ciprofloxacin which is the common choice of drug for the treatment of *E .coli* become somewhat resistant.

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